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Abstract

REACTOR CONTROL SYSTEMS

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The paper briefly discusses the main design principles of nuclear reactor control systems.

The requirements to the system design: maximum simplicity, channel duplicating, use of reliable elements (transistors, magnetic amplifiers, non-contact elements). The paper describes reactor monitoring, beginning from the subcritical condition, by means of instruments operating from the current ionisation chambers and gives the characteristics of the instruments which provide the means for the measurement of the period and power on a logarithmic and linear scale.

Two systems of automatic power level control are described, one exponential with a preset period, and the other linear. An emphasis is made on the advantages of one power controller, common for the entire system, with automatic and manual level correctors. The paper describes rod interrelation which enables automation of the processes requiring introduction of reactivity and compensation for the reactivity deviations which exceed the effectiveness of one rod.

The paper goes on to discuss the safety provisions, alarm system and emergency shut-down systems, the relation between the circumstances which require reactor shut-down and the means for quenching the reaction; specific features of the system for the power level overshoot control are noted.

The paper shows the advantages of the actuator control schemes using transistorised elements as compared with the control schemes using relays and contactors.